



U.S. Army Research, Development and
Engineering Command



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

**Zero Footprint Camp:
Waste Is a Resource**

**2009 Environment, Energy & Sustainability
Symposium & Exhibition
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MOBILE WASTE TO ENERGY CONVERSION



WASTE WATER PROCESSING & REUTILIZATION

"DESIGNER TRASH"

ZFC



KITCHEN SANITATION SYSTEM

COMPOSTING



Current Approach



Supplies (Logistics)



- Food
- Water
- Fuel
- Personal Items

Waste



- Dirty Used Water
- Sewage
- Food Garbage
- Trash
- Exhaust

Managing the Waste



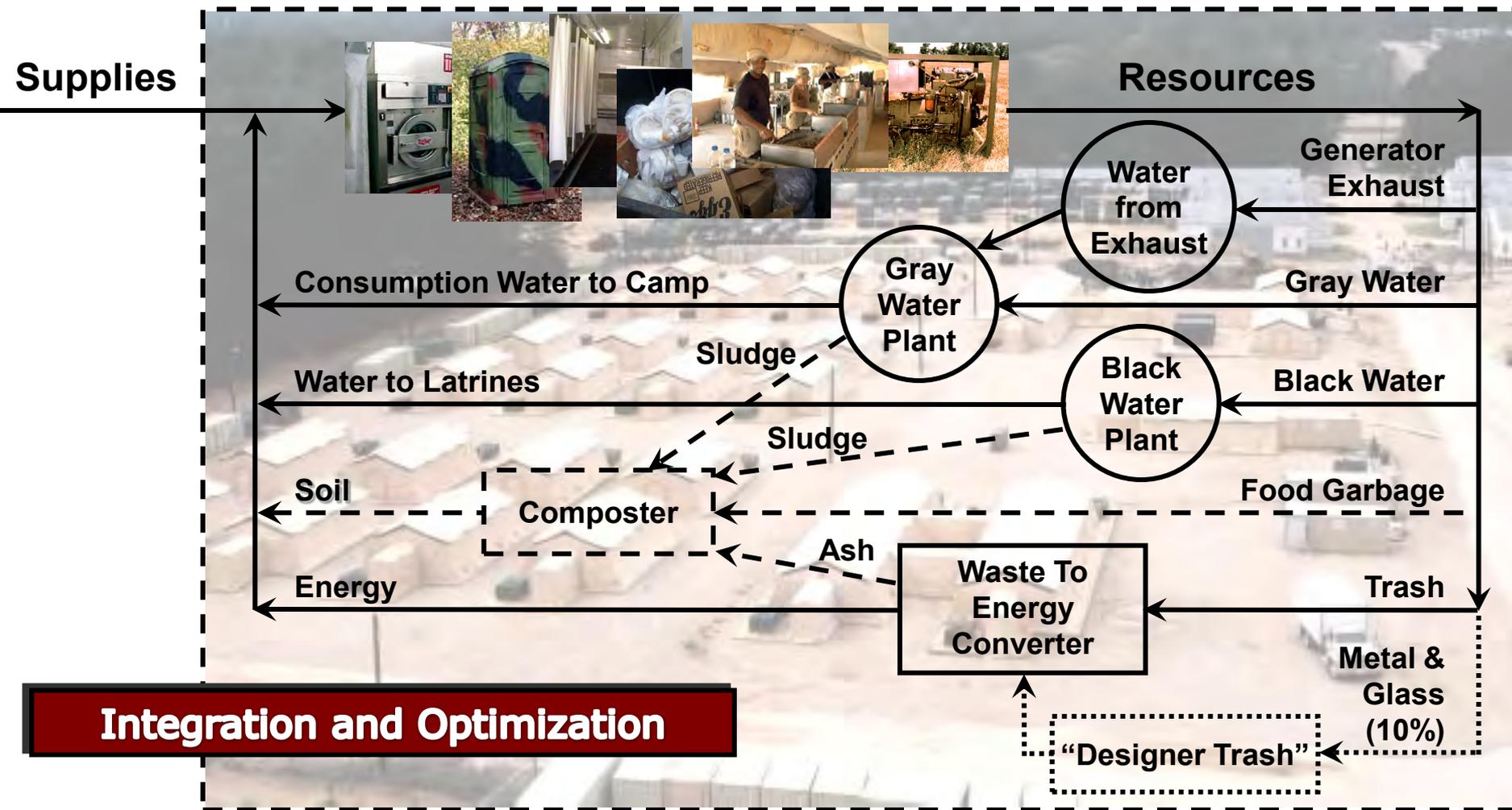
TzC Approach



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ZFC Integration: "Thinking Back Inside the Box"





- Relatively short window of opportunity
 - Length of current operations
 - Limited life span of lessons learned
- Demonstrate benefits to warfighters ASAP
 - Increased force protection
 - Decreased logistics footprint
- Implement spiraling acquisition concept
 - **Field what's available now**
 - Incorporate advancements when available



- Waste to Energy Conversion
- Gray & Black Water Processing
 - Integrated Battlefield Support System (IBSS) Membrane Bioreactor
- Gray Water Processing
 - Force Provider Shower Water Reuse System (SWRS)
- Black Water Processing
 - Spiral CAT
- Water from Exhaust
 - IBSS
- Designer Trash
 - Several Natick Soldier Center efforts underway
 - Army Environmental Quality Technology Program (EQT)
 - Strategic Environmental Research & Development Program (SERDP)
 - Environmental Security Technology Certification program (ESTCP)
 - DoD Combat Feeding Program

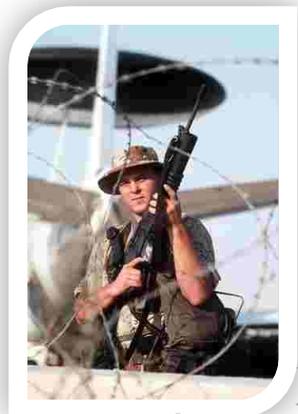


The ZFC Impact



Force Protection

Intelligence: Eliminates Enemy Intelligence Source
 Physical Security: Eliminates need for Civilian Access
 Health: Reduced DNBI Rates



Environment

Eliminates Compliance & Clean-Up
 Provides Enriched Soil for Soldier or Host Nation Use
 Reduces Greenhouse Gas Emissions
 Zero Footprint



Logistics & Sustainment

Reallocation of Engineer Assets
 Water Requirements Reduced by up to 80%
 Power Generation Augmented by 30%
 Diesel Fuel Requirements Reduced by 30%
 Transportation:
 Supply Convoys Reduced
 Waste Convoys Eliminated

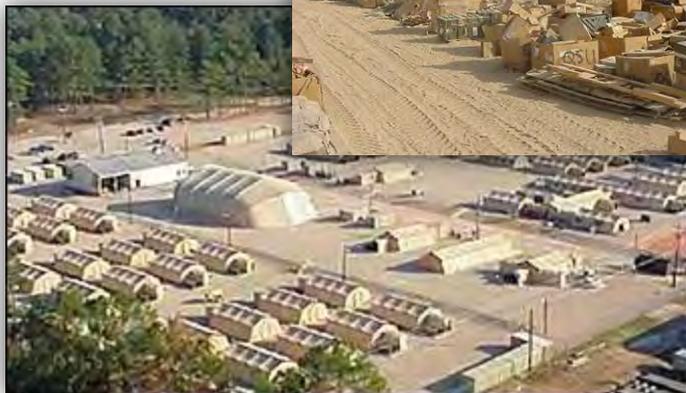


Potential Applications



Military

Operation Iraqi Freedom
 Operation Enduring Freedom
 Balkans Area of Operations
 Force Provider Modules
 Division Support Areas
 Temporary Ports



Civilian

Humanitarian Relief
 Disaster Aid



- Validated AERTA Requirement → High Priority P2
- PM-FSS Endorsement → Coordinating & Chairing an Environmental Technology Working Group
- NATO/SPSC Workshop → ZFC Concepts Integral to **“Best Practices” Guide**
- Engineer School → Chairing a Base Camp ICDDT
- DASA (ESOH) → **“Tell me how I can help”**



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